

## Proceedings of the Pakistan Academy of Sciences: B. Life and Environmental Sciences

### **Editor:**

**Irum Iqrar**, Pakistan Academy of Sciences, Islamabad; editor@paspk.org

### **Discipline Editors:**

**Agricultural Sciences: Kadambot Siddique**, The UWA Institute of Agriculture, The University of Western Australia, Perth, Australia

**Animal Sciences: Abdul Rauf Shakoori**, School of Biological Sciences, University of the Punjab, Lahore, Pakistan

**Food Sciences: G. Sarwar Gilani**, Nutrition and Health Advisor (Independent), Ottawa, Canada

**Biological Sciences: Azra Khanum**, University Institute of Biochemistry and Biotechnology, PMAS Arid Agriculture University Rawalpindi, Pakistan

**Environmental Sciences: Bin Chen**, State key Joint Laboratory of Environmental Simulation and Pollution Control School of Environment, Beijing Normal University, China

**Environmental Sciences: Zahir Ahmad Zahir**, Institute of Soil and Environmental Sciences, University of Agriculture, Faisalabad, Pakistan

**Health Sciences: Khalid Iqbal**, Department of Neurochemistry, New York State Institute for Basic Research, New York, USA

**Health Sciences: Anwar-ul-Hassan Gilani**, The University of Haripur, Haripur, Khyber Pakhtunkhwa, Pakistan

**Plant Sciences: Munir Ozturk**, Faculty of Science, Ege University, Izmir, Turkey

**Plant Sciences: Zabta K. Shinwari**, Department of Plant Sciences, Quaid-i-Azam University, Islamabad, Pakistan

### **Editorial Advisory Board:**

**Mohammad Perwaiz Iqbal**, School of Sciences University of Management and Technology, Lahore, Pakistan

**Ilkay Erdogan Orhan**, Faculty of Pharmacy, Gazi University, Ankara, Turkey

**Mohammad Wasay**, Department of Medicine, Aga Khan University, Karachi, Pakistan

**Kamal Chowdhury**, School of Natural Sciences & Mathematics, Claflin University, USA

**Shahid Mansoor**, National Institute for Biotechnology and Genetic Engineering (NIBGE), Faisalabad, Pakistan

**Darakhshan Jabeen Haleem**, Dr. Panjwani Center for Molecular Medicine and Drug Research, International Center for Chemical and Biological Sciences (ICCBS), University of Karachi, Karachi, Pakistan

**Muhammad Farooq**, Department of Plant Sciences, Sultan Qaboos University, Al-Khoud-123, Oman

**Riffat Naseem Malik**, Department of Environmental Sciences, Quaid-i-Azam University Islamabad

**Syed Ghulam Musharraf**, H.E.J. Research Institute of Chemistry International Center for Chemical and Biological Sciences (ICCBS), University of Karachi, Karachi, Pakistan

**Muhammad Shahzad Aslam**, School of Traditional Chinese Medicine, Xiamen University, Malaysia

**Muhammad Ansar**, Department of Biochemistry, Faculty of Biological Sciences, Quaid-i-Azam University, Islamabad, Pakistan

**Muhammad Zaffar Hashmi**, Department of Chemistry COMSATS University, Islamabad, Pakistan

**Hafiz Suleria**, Department of Agriculture and Food Systems, The University of Melbourne, Australia

**Amjad Ali**, Atta-ur-Rahman School of Applied Biosciences (ASAB), National University of Sciences & Technology (NUST), Islamabad, Pakistan

**Nudrat Aisha Akram**, Department of Botany, GC University, Faisalabad, Pakistan

**Roy Hendroko Setyobudi**, University of Muhammadiyah Malang, East Java, Indonesia